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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/917,842	07/27/2001	Barry L. Chin	5017/ISM/CORE MCVD/SB	3573

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APPLIED MATERIALS, INC.
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EXAMINER	
KOSOWSKI, ALEXANDER J	

ART UNIT	PAPER NUMBER
2125	

DATE MAILED: 03/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/917,842	CHIN ET AL.	
	Examiner	Art Unit	
	Alexander J Kosowski	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,13-15,17-36 and 38-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11, 13-15, 17-36 and 38-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 July 2001* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1) Claims 1-50 are presented for examination.

Claim Objections

2) The outstanding claim objections from the last office action are withdrawn in light of the amendment filed 12/21/04.

Claim Rejections - 35 USC § 112

3) The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4) Claim 48 is rejected under 35 U.S.C. 112 as not currently existing. Only claims 47, 49 and 50 are present. Claim 48 should either be added or canceled in any future responses.

Claim Rejections - 35 USC § 102

5) The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6) Claims 1, 5-6, 10-11, 13-15, 17, 19-25, 28-29, 31-35, 38-40, 42-47 and 49 are rejected under 35 U.S.C. 102(e) as being unpatentable over Ting et al (U.S. Pat 4,423,701). The claimed invention reads on Ting as follows:

Referring to claim 1, Ting discloses an apparatus comprising a deposition chamber, wherein the deposition chamber is divided into two or more deposition regions that are integrally

connected to one another (col. 4 lines 48-63), and a wafer support disposed in the deposition chamber, whereby the wafer support is vertically moveable between the two or more interconnected deposition regions (col. 3 lines 1-16).

Referring to claims 5-6, Ting discloses that the deposition regions are integrally connected with an aperture and that the aperture is sealed to minimize the intermixing of deposition gases between the regions (col. 8 line 57 through col. 9 line 42).

Referring to claim 10, Ting discloses a method of depositing a material layer on a substrate comprising positioning a wafer on a wafer support in a deposition chamber comprising a first and second deposition region, wherein the first and second deposition regions are integrally connected to one another, and wherein the wafer support is moveable between the first and second deposition regions (col. 4 lines 48-63 and col. 3 lines 1-16), introducing a first deposition gas into the first deposition region and a second deposition gas into the second deposition region (col. 4 line 64 through col. 5 line 11), moving the wafer support with the substrate thereon into the first deposition region wherein a first monolayer of the deposition gas is chemisorbed onto the surface of the substrate, changing the elevation of the wafer support to transport the substrate thereon into the second deposition region wherein a first monolayer of the second deposition gas is chemisorbed on the first monolayer of the first deposition gas, and repeating until a desired thickness is achieved (col. 3 lines 1-16).

Referring to claim 11, the claim varies from claim 10 in that it claims a software routine executed on a computer storage medium rather than a method. The rejected method of claim 10 could inherently be executed via a software routine on a computer storage medium. Therefore, referring to claim 11, see rejection of claim 10 above.

Referring to claim 13, Ting teaches that the first and second deposition regions are vertically stacked (col. 12 lines 20-23).

Referring to claims 14-15, Ting discloses first and second orifices for providing process gas to first and second deposition regions (col. 6 lines 60-64) and that the first orifice may be disposed vertically above the second orifice (col. 12 lines 20-23, whereby the deposition regions are vertically stacked and therefore the orifices would be vertically disposed).

Referring to claim 17, Ting discloses a method of depositing a material layer on a substrate comprising positioning a substrate on a substrate support in a deposition chamber comprising a first deposition region and a second deposition region, wherein the first and second deposition regions are integrally connected to one another (col. 4 lines 48-63), depositing a first monolayer on the substrate disposed in the first deposition region, elevating the wafer to the second deposition region, and depositing a layer on the wafer in the second deposition region (col. 3 lines 1-16).

Referring to claim 19, Ting discloses that first and second gases are introduced into the first and second deposition regions (col. 5 lines 1-11 and col. 6 lines 60-64).

Referring to claim 20, Ting discloses an apparatus comprising a deposition chamber, wherein the deposition chamber is divided into two or more deposition regions that are integrally connected to one another, at least one of said regions being adapted to support deposition of a monolayer upon a surface of a substrate (col. 4 lines 48-63), and a wafer support disposed in the deposition chamber and having a horizontal wafer supporting surface, wherein the wafer support is moveable between the two or more interconnected deposition regions (col. 3 lines 1-16 and Figures 3A and 3B).

Referring to claim 21, Ting discloses that at least one of the regions is sealed to minimize the intermixing of deposition gases within two or more deposition regions (col. 8 line 57 through col. 9 line 42).

Referring to claims 22-24, Ting teaches that said chamber further comprises an orifice for each of said deposition regions, each orifice adapted to provide process gas to a respective deposition region (col. 5 lines 1-11 and col. 6 lines 60-64).

Referring to claim 25, Ting teaches that one of said deposition regions may be vertically stacked above another of said deposition regions (col. 12 lines 18-24).

Referring to claim 28, Ting teaches that at least one deposition region is adapted to support deposition via chemisorption (col. 1 line 56 through col. 2 line 11).

Referring to claim 29, Ting teaches an apparatus comprising a deposition chamber wherein the deposition chamber is divided into one or more deposition regions that are integrally interconnected to one another (col. 4 lines 48-63), at least one of said deposition regions being adapted to support deposition of a first monolayer upon a surface of a substrate and at least one of said deposition regions being optionally sealable from the other deposition regions (col. 8 line 57 through col. 9 line 42); and a wafer support disposed in the deposition chamber and configured to support the substrate horizontally, wherein the wafer support is moveable between two or more interconnected deposition regions (col. 3 lines 1-16 and Figures 3A and 3B).

Referring to claim 31, see rejection of claim 21 above.

Referring to claims 32, see rejection of claim 22 above.

Referring to claims 33-34, see rejection of claims 23-24 above.

Referring to claim 35, see rejection of claim 25 above.

Referring to claim 38, see rejection of claim 28 above.

Referring to claim 39, Ting teaches flowing a purge gas into at least one of the integrally connected deposition regions between the introduction of the first and second deposition gases (col. 6 lines 50-64).

Referring to claim 40, Ting teaches moving the substrate support vertically (col. 3 lines 1-16).

Referring to claim 42, Ting teaches an apparatus comprising a deposition chamber body having a sealable port configured for horizontal entry and egress of a substrate (col. 4 lines 48-63), at least two or more deposition regions defined in the chamber body, at least a first deposition region of said deposition regions is adapted to support vertical deposition of a first monolayer upon a surface of a substrate (col. 10 line 64 through col. 11 line 14), and a wafer support disposed in the deposition chamber, wherein the wafer support is moveable between two or more interconnected deposition regions (col. 3 lines 1-16).

Referring to claim 43, see rejection of claim 6 above.

Referring to claim 44, Ting teaches that a second deposition region is adapted to support deposition of a second monolayer (col. 3 lines 1-16).

Referring to claim 45, see rejection of claim 6 above.

Referring to claims 46-47, see rejection of claims 22-23 above.

Referring to claim 49, see rejection of claim 25 above.

Claim Rejections – 35 USC § 103

7) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8) Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ting, further in view of Matsukawa et al (U.S. Pat 5,518,542).

Referring to claim 2, Ting discloses the apparatus shown above. However, Ting does not explicitly teach a piston coupled to the wafer support for moving the wafer support between the two or more interconnected deposition regions.

Matsukawa teaches a wafer support whereby a piston is used to raise and lower the wafer (col. 7 lines 39-46).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a piston in the apparatus taught by since using a piston in conjunction with a wafer support allows the wafer to be moved to multiple vertical positions (Matsukawa, col. 7 lines 39-54). In addition, it is noted that using a piston is a well known method for lifting a platform.

9) Claims 3 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ting et al (U.S. Pat 4,423,701), further in view of Okase et al (U.S. Pat 6,497,767).

Referring to claim 3, Ting teaches the above. However, Ting does not explicitly teach a heater wherein the heater is adapted to control the temperature of the wafer support.

Okase teaches the use a built-in heater in a wafer support (col. 2 lines 29-31).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a heater in the invention taught by Ting since this would allow a constant temperature to be maintained in the supporting body (Okase, col. 2 lines 29-31).

Referring to claims 7-9, Ting discloses the apparatus shown above. In addition, Ting discloses that gas may enter the processing chambers and be purged (col. 6 lines 50-64). However, Ting does not explicitly teach a gas supply panel coupled to the deposition chamber, nor gas lines which couple the gas supply panel to the deposition chamber, nor a gas exhaust pump coupled to the deposition chamber.

Okase teaches an apparatus comprising a deposition chamber coupled to a gas supply panel via gas lines (col. 3 lines 42-50, whereby a gas port would be connected to a supply system via a line), and comprising a gas exhaust pump coupled to the deposition chamber (col. 3 lines 42-50).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a gas exhaust pump in the apparatus taught by Ting since an exhaust pump would allow gases to be removed from the processing tube (Okase, col. 3 lines 45-47) and to utilize a gas control panel and gas supply lines in the apparatus taught by Ting since this would allow the introduction of process gas and / or inert gas into the processing tube (Okase, col. 3 lines 42-43).

10) Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ting, further in view of Doering et al (U.S. Pat 6,387,185).

Referring to claim 4, Ting discloses the apparatus shown above. However, Ting does not explicitly teach that the wafer support is an electrostatic chuck.

Doering teaches a deposition apparatus whereby a wafer in a processing chamber may be secured via an electrostatic chuck (col. 9 lines 48-51).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize an electrostatic chuck in the apparatus taught by Ting since clamping a substrate to an electrostatic chuck prevents backside deposition of the substrate (Doering, col. 7 lines 21-24).

11) Claims 18, 27 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ting, further in view of Sherman (U.S. Pat 5,916,365).

Referring to claim 18, Ting teaches the method above. However, Ting does not explicitly teach depositing a second monolayer on the wafer in the second deposition region.

Sherman teaches a chemical vapor deposition apparatus whereby multiple monolayers are deposited in a single deposition region (col. 5 lines 9-33).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to deposit multiple monolayers in a single deposition region in the method taught by Ting since this would allow a film of a desired thickness to be grown (Sherman, col. 5 lines 20-21).

Referring to claim 27, see rejection of claim 18 above.

Referring to claim 30, see rejection of claim 18 above.

12) Claims 26, 36, 41 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ting, further in view of Nath (U.S. Pat 4,423,701).

Referring to claims 26, 36, 41 and 50, Ting teaches the above. However, Ting does not explicitly teach that the deposition regions are positioned side by side, nor that the substrate support may move horizontally.

Nath teaches a multi-deposition chamber device whereby multiple deposition regions are located side by side and whereby a substrate support moves horizontally between them (col. 7 line 67 through col. 8 line 19 and Figure 4).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to position deposition regions side by side and horizontally move the substrate support in the invention taught by Ting above since this would allow successive alloy layers to be deposited on a substrate as it moves through deposition chambers (Nath, col. 7 line 67 through col. 8 line 19 and Figure 4).

Conclusion

13) The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Toshima et al (U.S. Pat 6,656,373) – teaches a film forming system.

14) Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander J Kosowski whose telephone number is 571-272-3744. The examiner can normally be reached on Monday through Friday, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on 571-272-3749. The fax phone number for the

organization where this application or proceeding is assigned is (703) 872-9306. In addition, the examiner's RightFAX number is 571-273-3744.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Alexander J. Kosowski
Patent Examiner
Art Unit 2125

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